

## **AMENDMENTS TO THE CLAIMS**

The following listing of claims will replace all prior versions and listings of claims in the application.

### **LISTING OF CLAIMS**

1. (cancelled)
2. (currently amended) The method of claim [1] 5 wherein said irradiation step produces a particle beam with an energy level greater than or equal to about 100keV.
3. (currently amended) ~~The method of Claim 1~~ A method of generating a collimated beam of high-energy particles comprising:  
producing a laser beam having an intensity greater than or equal to about  $10^{18}$  W/cm<sup>2</sup> and a pulse duration less than or equal to about  $10^{-9}$  seconds; and  
irradiating an irradiation target capable of releasing high energy ions with said laser beam,  
wherein said irradiation step produces a particle beam directed to within about 40 degrees of normal to said irradiation target.
4. (currently amended) ~~The method of claim 1~~ A method of generating a collimated beam of high-energy particles comprising:

producing a laser beam having an intensity greater than or equal to about  $10^{18}$  W/cm<sup>2</sup> and a pulse duration less than or equal to about  $10^{-9}$  seconds; and

irradiating an irradiation target capable of releasing high energy ions with said laser beam,

wherein said pulse duration is less than or equal to about  $10^{-11}$  seconds.

5. (currently amended) ~~The method of claim 1~~ A method of generating a collimated beam of high-energy particles comprising:

producing a laser beam having an intensity greater than or equal to about  $10^{18}$  W/cm<sup>2</sup> and a pulse duration less than or equal to about  $10^{-9}$  seconds; and

irradiating an irradiation target capable of releasing high energy ions with said laser beam,

wherein said laser beam has a repetition rate greater than or equal to about  $10^{-3}$  Hz.

6. (currently amended) ~~The method of claim 1~~ A method of generating a collimated beam of high-energy particles comprising:

producing a laser beam having an intensity greater than or equal to about  $10^{18}$  W/cm<sup>2</sup> and a pulse duration less than or equal to about  $10^{-9}$  seconds; and

irradiating an irradiation target capable of releasing high energy ions with said laser beam,

wherein said irradiation target further comprises one of a solid, a liquid jet, and a droplet jet.

7. (currently amended) ~~The method of claim 1~~ A method of generating a collimated beam of high-energy particles comprising:

producing a laser beam having an intensity greater than or equal to about  $10^{18}$  W/cm<sup>2</sup> and a pulse duration less than or equal to about  $10^{-9}$  seconds;

irradiating an irradiation target capable of releasing high energy ions with said laser beam; and

~~further comprising~~ inducing a nuclear reaction by colliding said particle beam into a secondary target containing a nuclei.

8. (original) The method of claim 7 wherein said secondary target is merged with said irradiation target.

9. (original) The method of Claim 7 wherein said particle beam includes at least one of protons, deuterons, and tritons.

10. (original) The method of claim 7 wherein said secondary target further comprises at least one of boron, carbon, nitrogen, oxygen, and neon.

11. (original) The method of claim 7 wherein said particle beam further comprises protons and said secondary target further comprises at least one of boron-11, boron-10, nitrogen-14, oxygen-16, nitrogen-15, and oxygen-18.

12. (withdrawn) The method of claim 7 wherein said particle beam further comprises deuterons and said secondary target further comprises at least one of boron-10, carbon-12, nitrogen-14, and neon-20.

13. (original) The method of claim 7 wherein said laser beam includes a pulse interval shorter than a half-life of isotopes produced by said nuclear reaction.

14. (original) The method of claim 7 wherein said particle beam includes excited atomic nuclei.

15. (cancelled)

16. (currently amended) ~~The apparatus of claim 15~~ An apparatus for generating a collimated beam of high-energy particles comprising:

a laser adapted to generate a laser beam having an intensity greater than or equal to about  $10^{18}$  W/cm<sup>2</sup> and a pulse duration less than or equal to about  $10^{-9}$  seconds; and

an irradiation target capable of releasing high energy ions disposed in irradiation receiving relation to said laser beam,

wherein said irradiation target further comprises one of a solid, a liquid jet, and a droplet jet.

17. (currently amended) ~~The apparatus of claim 15~~ An apparatus for generating a collimated beam of high-energy particles comprising:

a laser adapted to generate a laser beam having an intensity greater than or equal to about  $10^{18}$  W/cm<sup>2</sup> and a pulse duration less than or equal to about  $10^{-9}$  seconds;

an irradiation target capable of releasing high energy ions disposed in irradiation receiving relation to said laser beam; and

~~further comprising:~~ a secondary target containing a nuclei disposed downstream of said irradiation target and receiving a particle beam from said irradiation target to induce a nuclear reaction.

18. (currently amended) ~~The apparatus of claim 15~~ An apparatus for generating a collimated beam of high-energy particles comprising:

a laser adapted to generate a laser beam having an intensity greater than or equal to about  $10^{18}$  W/cm<sup>2</sup> and a pulse duration less than or equal to about  $10^{-9}$  seconds; and

an irradiation target capable of releasing high energy ions disposed in irradiation receiving relation to said laser beam,

wherein said secondary target is merged with said irradiation target.

19. (currently amended) ~~The apparatus of claim 15~~ An apparatus for generating a collimated beam of high-energy particles comprising:

a laser adapted to generate a laser beam having an intensity greater than or equal to about  $10^{18}$  W/cm<sup>2</sup> and a pulse duration less than or equal to about  $10^{-9}$  seconds; and

an irradiation target capable of releasing high energy ions disposed in irradiation receiving relation to said laser beam,

wherein said particle beam includes at least one of protons, deuterons, and tritons.

20. (currently amended) ~~The apparatus of claim 15~~ An apparatus for generating a collimated beam of high-energy particles comprising:

a laser adapted to generate a laser beam having an intensity greater than or equal to about  $10^{18}$  W/cm<sup>2</sup> and a pulse duration less than or equal to about  $10^{-9}$  seconds; and

an irradiation target capable of releasing high energy ions disposed in irradiation receiving relation to said laser beam,

wherein said secondary target further comprises at least one of boron, carbon, nitrogen, oxygen, and neon.